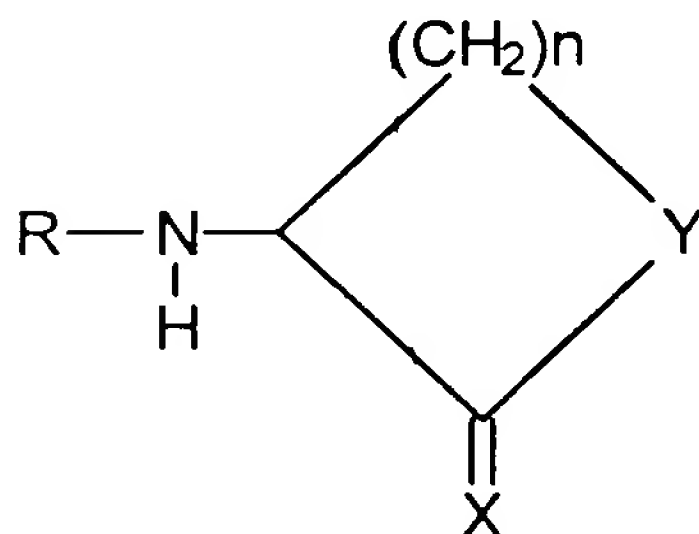


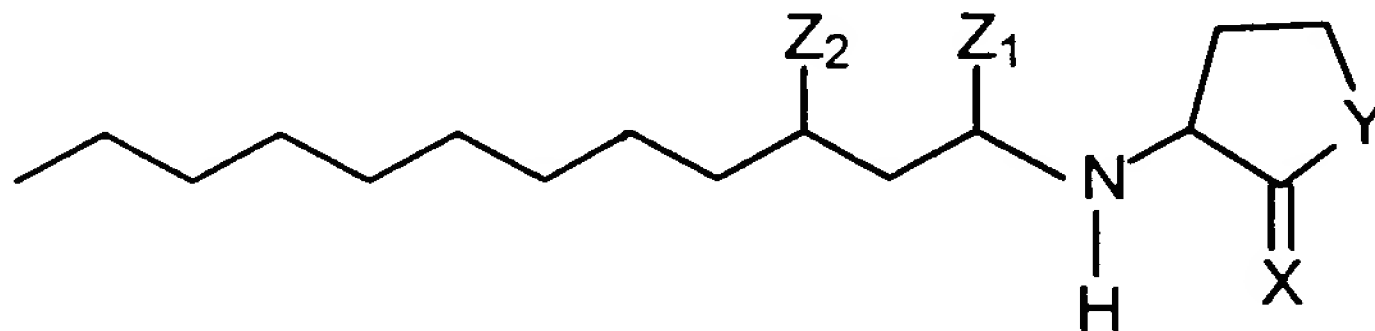
CLAIMS

1. N-(3-oxododecanoyl)homoserine lactone.
2. An autoinducer molecule comprising a molecule of the formula:



wherein n is 2 or 3; Y is O, S, or NH; X is O, S, or NH; and R is a fatty hydrocarbon or acyl moiety that may be substituted or a moiety having at least seven members containing a ring structure that may be substituted; the molecule being able to regulate the activity of the LasR protein of *Pseudomonas aeruginosa*.

3. The autoinducer molecule of claim 2 wherein R is a C₇ - C₁₄ acyl moiety.
4. The autoinducer molecule of claim 3 wherein R is a C₁₀ or higher acyl moiety.
5. The autoinducer molecule of claim 4 wherein R is a C₁₂ acyl moiety.
6. The autoinducer molecule of claim 5 wherein the molecule is of the formula



wherein X and Y are as defined above and Z₁ and Z₂ are independently selected from the group consisting of hydrogen, =O, =S, and =NH; the molecule being able to regulate gene expression.

7. The autoinducer molecule of claim 6 wherein the molecule is N-(3-oxododecanoyl)homoserine lactone.

8. The autoinducer molecule of claim 2 wherein R contains a heterocyclic ring structure.

9. The autoinducer molecule of claim 8 wherein the heterocyclic ring structure has five to seven ring members.

10. The autoinducer molecule of claim 9 wherein the heterocyclic ring structure contains oxygen.

11. The autoinducer molecule of claim 2 wherein R contains a carbocyclic ring structure.

12. The autoinducer of claim 11 wherein the carbocyclic ring structure is a fused ring system.

13. The autoinducer molecule of claim 2 wherein the molecule is purified from the native source.

14. The autoinducer molecule of claim 13 wherein the native source is the culture media of *Pseudomonas aeruginosa*.

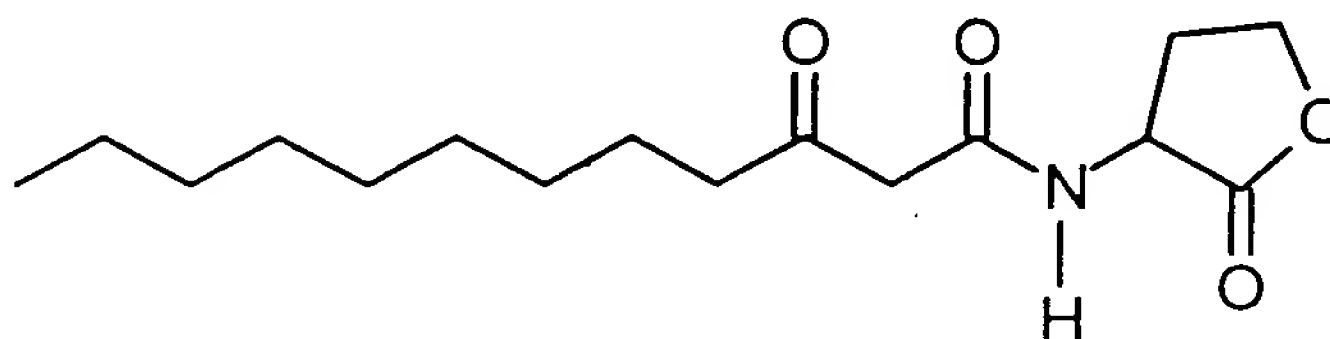
15. The autoinducer molecule of claim 2 wherein the molecule is synthesized by chemical means.

16. The autoinducer molecule of claim 2 wherein the molecule is an optically active isomer.

17. The autoinducer molecule of claim 16 wherein the isomer is the L-isomer.

18. The autoinducer molecule of claim 16 wherein the isomer is the D-isomer.

19. An autoinducer molecule comprising a molecule of the formula:



the molecule being able to regulate gene expression.

20. The autoinducer molecule of claim 19 wherein the gene expression within bacteria is regulated.

21. An analog of N-(3-oxododecanoyl)homoserine lactone that affects the activity of the LasR protein.

22. The analog of claim 21 wherein the analog inhibits the autoinducer activity of the N-(3-oxododecanoyl)homoserine lactone.

23. The analog of claim 21 wherein the analog synergistically enhances the autoinducer activity of N-(3-oxododecanoyl)homoserine lactone.

24. The analog of claim 21, wherein the analog is an agonist of the LasR protein of *Pseudomonas aeruginosa*.

25. The analog of claim 21, wherein the analog is an antagonist of the LasR protein of *Pseudomonas aeruginosa*.

26. A method of selecting inhibitors of the autoinducer molecule of *Pseudomonas aeruginosa* comprising:
contacting the autoinducer molecule with a suspected inhibitor;
measuring the ability of the treated autoinducer molecule to stimulate the activity of a selected gene;
determining whether the suspected inhibitor inhibits the ability of the autoinducer molecule to stimulate the activity of a selected gene; and
selecting the suspected inhibitors that inhibit the autoinducer molecule.
27. A method of selecting synergists of the autoinducer molecule of *Pseudomonas aeruginosa* comprising:
contacting the autoinducer molecule with a suspected synergist;
measuring the ability of the treated autoinducer molecule to stimulate the activity of a selected gene;
determining whether the suspected synergist enhances the ability of the autoinducer molecule to stimulate the activity of a selected gene; and
selecting the suspected synergists that enhance the activity of the autoinducer molecule.
28. A therapeutic composition comprising an agent having the ability to inhibit the activity of the LasR protein of *Pseudomonas aeruginosa* and a pharmaceutically acceptable carrier.
29. The therapeutic composition of claim 28 wherein the agent is a molecule which inhibits the autoinducer activity of N-(3-oxododecanoyl)homoserine lactone.

30. A method of inhibiting the infectivity of *Pseudomonas aeruginosa* comprising administering to an individual a therapeutically effective amount of an agent that inhibits the activity of the LasR protein.
31. A method of treating an immunocompromised individual infected with *Pseudomonas aeruginosa* comprising administering to the individual a therapeutically effective amount of an agent that inhibits the activity of the LasR protein.
32. A method of claim 31 wherein the immunocompromised individual is afflicted with cystic fibrosis.
33. A culture medium containing as an added compound N-(3-oxododecanoyl)homoserine lactone at a concentration effective to stimulate or promote cellular metabolism, growth, or recovery.
34. The culture medium of claim 33 wherein the cellular growth of *Pseudomonas aeruginosa* is stimulated or enhanced.
35. A method of regulating the expression of a gene comprising:
inserting a gene into bacteria chosen for enhancement of gene expression by an agent that enhances the activity of the LasR protein; and
incubating the bacteria with an agent that enhances the activity of the LasR protein such that the expression of the gene is regulated.
36. The method of claim 35 wherein the method further comprises the additional steps of:
allowing the gene expression to reach a desired level; and
incubating the bacteria with an agent that inhibits the activity of the LasR protein regulating the gene expression by the bacteria.
37. A method of regulating the expression of a gene comprising:
inserting a gene into a cell chosen for enhancement of gene expression by N-(3-oxododecanoyl)homoserine lactone; and

incubating the cell with N-(3-oxododecanoyl)homoserine lactone such that the expression of the gene is regulated.

38. The method of claim 37 wherein the method further comprises the additional steps of:

allowing the gene expression to reach a desired level; and
incubating the cell with an agent that inhibits the activity
N-(3-oxododecanoyl)homoserine lactone regulating the gene expression by
the cell.

39. An inhibitor of the autoinducer activity of
N-(3-oxododecanoyl)homoserine lactone.

40. An analog of N-(3-oxododecanoyl)homoserine lactone that
inhibits the induction of virulence factors by
N-(3-oxododecanoyl)homoserine lactone or LasR.

41. The analog of claim 40 wherein the virulence factor is
exotoxin A.

42. The analog of claim 40 wherein the virulence factor is an
elastolytic protease.

43. The analog of claim 40 wherein the virulence factor is an
alkaline protease.